Abstracts

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Angiotensin-Converting Enzyme (*ACE, I/D*) Gene Polymorphism and Susceptibility to Abdominal Aortic Aneurysm or Aortoiliac Occlusive Disease

Korcz A, Mikolajczyk-Stecyna J, Gabriel M, et al. J Surg Res 2009;153:76-82.

Conclusion: Gene polymorphism of the angiotensin-converting enzyme gene (*ACE, I/D*) does not predispose to aortoiliac occlusive disease (AIOD) but may be a factor in development of abdominal aortic aneurysm (AAA) when combined with hypertension.

Summary: In 1992 Cambien et al noted an association between angiotensin-converting enzyme (*ACE, I/D*) gene polymorphisms with coronary artery disease and myocardial infarction. ACE levels in plasma and tissue are under genetic control, and about 50% of the ACE plasma level variability is associated with *I/D* gene polymorphism (Nature 1992;359: 641-4 and J Clin Invest 1990;86:1343-47). It is thought that an increase in ACE plasma levels affects angiotensin plasma levels, which can affect remodeling of vascular tissue in atherosclerosis. *ACE D* allele carriers have higher ACE plasma and tissue levels compared with those with *I/D* and *II* genotypes. *ACE DD* homozygotes have approximately twice higher levels of angiotensin 2 than do *II* homozygotes, with *I/D* individuals having intermittent ACE concentrations. The authors investigated 829 individuals with aortoiliac disease or controls. There were 133 patients with AAA, 152 with AIOPD, and a random Polish population of 392 patients who underwent *ACE I/D* gene polymorphism analysis. Analysis was performed by polymerase chain reaction and gel electrophoresis. Results indicated that genotype distribution and allele frequency of *ACE I/D* were not significantly different between patients with AAA or AIOD vs the control group. Differences were found in hypertensive patients with AAA vs normotensive patients with AAA (odds ratio, 3.05; 95% confidence interval, 1.22-7.79; $P = .015$) and hypertensive patients with AAA vs the population group (odds ratio, 2.56; 95% confidence interval, 1.27-5.16; $P = .007$). There was no relationship between ACE gene polymorphism and hypertension in the AIOD group.

Comment: There have been mixed results analyzing the effects of polymorphisms of the ACE gene in the development of AAA. Patients in this study were Polish, whereas previous studies on Italian patients had suggested a stronger relationship between *ACE* polymorphism and development of AAA (Eur J Vasc Endovasc Surg 2001;21:445-50). Although there may be ethnic differences in susceptibility to polymorphisms of the ACE gene in the development of AAA, there are certainly many other unrecognized confounding variables and environmental factors that may also lead to these discrepant observations. Additional studies in other populations, considering environmental factors and perhaps ethnic variability, will be necessary to establish the role of the ACE gene in the development of AAA and the possible benefit of treatment with ACE inhibitors in patients at risk for AAA.

Atherosclerotic Plaque Progression in Carotid Arteries: Monitoring with High-Spatial-Resolution MR Imaging—Multicenter Trial

Boussel L, Arora S, Rapp J, et al. Radiology 2002;252:789-96.

Conclusion: Magnetic resonance (MR) techniques can document that the rate of increase in vessel wall volume in patients with pre-existing cardiac disease is slowed by statin therapy.

Summary: Luminal diameter is the primary imaging variable for defining progression of carotid stenosis. Diameter is only one way of characterizing a complex lesion, however, and changes in the luminal diameter may not reflect plaque remodeling. The authors postulate that geometric and compositional features of an atherosclerotic plaque might better help define an unstable plaque. Potential variables include the volume of the plaque, extent of irregularity of the plaque surface, fibrous cap thickness, and size and location of the necrotic plaque core. The current study, Monitoring Atherosclerotic Plaque Progression (MAPP), is a National Institutes of Health-funded prospective study involving six centers in the United States and Canada. A primary goal was to estimate the annualized rate of progression of vessel wall volume in carotid arteries. An additional goal was to establish how frequently MR studies have acceptable image quality to determine plaque volume. The study recruited 160 patients with >50% stenosis of the carotid artery. They underwent prospective imaging of the carotid arteries at baseline and 1 year later using high spatial resolution 1.5-T MR imaging. Only studies with acceptable image quality were included. All 160 patients completed both baseline and follow-up studies. Of these, 67.5% were deemed to have had image quality that was acceptable for a quantitative analysis. Rejection of images was primarily for motion artifact or deep location of the artery. The mean annual change in vessel wall volume was 2.31% ± 10.88%. With follow-up at 1 year, vessel wall volumes in patients who did not receive statin therapy had increased faster compared with those patients who received statin therapy (7.8% ± 13.58% vs 1.4% ± 9%, respectively; $P = .029$).

Comment: The report indicates quantitative MR imaging can determine annual rates of progression of carotid wall volume and that statin therapy appears effective in reducing the rate of progression of carotid wall volume. The changes measured were real but small and of uncertain clinic relevance. Statins probably work in a number of ways, and among the mechanisms are both stabilization of larger existing plaques and retarding of growth of smaller lesions.

Early Evaluation of Acute Traumatic Coagulopathy by Thrombelastography

Carroll RC, Craft RM, Langdon RJ, et al. Transl Res 2009;154:34-9.

Conclusion: PlateletMapping assays correlate with a need for blood transfusion and abnormal thrombelastogram parameters correlate with death.

Summary: There is a significant association between post-traumatic coagulopathy and death. It is postulated that poor perfusion coupled with shock and tissue factor release along with thrombin generation results in an imbalance of the thrombin-thrombomodulin-protein C pathway (Ann Surg 2007;245:812-8). Overactivated protein C leads to loss of factors Va and VIIIa. This results in an impaired coagulation and coagulopathy manifesting as consumption or dilution of clotting factors, hyperthermia, acidosis, and platelet dysfunction or consumption (J Trauma 2008;64:s64-8). In this study the authors sought to determine how early after trauma coagulopathy could be observed and to assess whether coagulopathy as determined by thrombelastogram (TEG) and PlateletMapping correlated with post-traumatic transfusion or death. TEG assays were performed on 161 patients treated at a level 1 trauma center during a 12-month period. Inclusion criteria were an injury severity score >9 and air ambulance transport. The investigators collected a citrated blood sample at the accident scene before fluid resuscitation. A second citrated and heparinized blood sample was collected ≤1 hour of arrival in the emergency department. Citrated blood samples were analyzed by the TEG system for reaction (R) time, clot formation (K) time, clotting rate (angle), strength of clot (maximum amplitude [MA]), and percent fibrinolysis at 60 minutes (LY60). The heparinized blood sample was analyzed by PlateletMapping assays for fibrinogen levels and adenosine diphosphate (ADP)-platelet activation. Comparisons were made between on-site and emergency department assays and subsequent death or need for transfusion. No real differences in the TEG parameters were observed from on-site vs those obtained in the emergency department. TEG parameters did not correlate with the need for transfusion; however, poor platelet function observed by PlateletMapping did significantly correlate with need for transfusion. Abnormal ADP-platelet activation was highly correlated with the need for transfusion ($P = .013$). There was a significant correlation of all standard TEG parameters with death. Fibrinogen levels <100 mg/dL, as determined by PlateletMapping, also significantly correlated with death.

Comment: The study demonstrates coagulopathy can be detected quickly after trauma and presumably after any event producing acute blood loss such as rupture of an abdominal or thoracic aneurysm. There was little difference between TEG parameters measured at the site of the accident vs those measured in the emergency department. Currently, decisions to transfuse packed red cells or fresh frozen plasma are empiric. It may be that the TEG system along with PlateletMapping can provide evidence-based transfusion and more efficient use of blood products in the bleeding patient.

Elective Amputation of the Toes in Severe Lymphedema of the Lower Leg: Rationale and Indications

Chen H, Gharb BB, Salgad CJ, et al. Ann Plast Surg 2009;63:193-7.

Conclusion: Elective toe amputation in combination with the Charles procedure reduces long-term morbidity associated with advanced lymphedema of the lower limb.

Summary: In advanced lymphedema, the skin develops a peau d'orange appearance with papillomatosis and hyperkeratosis. These changes lead to gradual sealing of the intradigital spaces, with resulting bacterial and fungal infection and worsening of lymphedema. Between January 1990 and July 2006, the authors offered an elective Charles procedure along with disarticulation of the toes to their patients with stage III lymphedema (elephantiasis with a grossly increased volume of the limb associated with dermatosclerosis and papillomatosis lesions). Ten patients underwent an elective Charles procedure accompanied with toe disarticulations, and 24 patients underwent the Charles procedure alone. The Charles procedure was performed with a pneumatic tourniquet. Subcutaneous tissue and skin was